

CLAIMS

What is claimed is:

1. A charge pump circuit comprising:
charge pumping capacitance;
switches that vary voltage across the pumping capacitance to provide a pumped voltage output from an input voltage; and
a clamp circuit between the input and output to prevent the output voltage from being significantly below the input voltage.

- 10 2. A charge pump circuit as claimed in claim 1 wherein the clamp comprises a transistor.

3. A charge pump circuit as claimed in claim 2 wherein the transistor is controlled by a comparator.

- 15 4. A charge pump circuit as claimed in claim 3 wherein the comparator exhibits hysteresis.

5. A charge pump circuit as claimed in claim 2 wherein the transistor is controlled by an amplifier.

- 20 6. A charge pump circuit as claimed in claim 2 wherein the transistor is a field effect transistor.

- 25 7. A gate controller comprising:
charge pumping capacitance;
switches that vary voltage across the pumping capacitance to provide a pumped gate control voltage from an input voltage; and

a clamp circuit between the input and output to prevent the pumped voltage from being significantly below the input voltage.

8. A gate controller as claimed in claim 7 wherein the clamp comprises a
5 transistor.

9. A gate controller as claimed in claim 8 wherein the transistor is controlled by a comparator.

10. A gate controller as claimed in claim 9 wherein the comparator exhibits hysteresis.
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11. A gate controller as claimed in claim 8 wherein the transistor is controlled by an amplifier.
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12. A gate controller as claimed in claim 8 wherein the transistor is a field effect transistor.
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13. A DC/DC converter having controlled switches comprising:
20 charge pumping capacitance;
switches that vary voltage across the pumping capacitance to provide a pumped gate control voltage to the controlled switches from an input voltage;
and
a clamp circuit between the input and output to prevent the pumped
25 voltage from being significantly below the input.
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14. A DC/DC converter as claimed in claim 13 wherein the clamp comprises a transistor.
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15. A DC/DC converter as claimed in claim 14 wherein the transistor is controlled by a comparator.

5 16. A DC/DC converter as claimed in claim 15 wherein the comparator exhibits hysteresis.

17. A DC/DC converter as claimed in claim 14 wherein the transistor is controlled by an amplifier.

10 18. A DC/DC converter as claimed in claim 14 wherein the transistor is a field effect transistor.